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ABSTRACT

The paper examines the application of IMS--Instruction Management Systems--on classroom instruction with exceptional students. IMS, a computer-based material generation and record management software program which has been field tested in secondary school resource rooms in Utah and Idaho, is a unique model in that it includes aspects of both computer assisted instruction and computer managed instruction. Each of the major components of IMS are described: sequenced objectives, placement tests, worksheets (instruction, practice, mastery, and review worksheets), student progress records, and accompanying teacher manual. So far, teacher reactions to the product have been favorable, and it is possible that IMS may soon become a useful "electronic aide" in the classroom. (CL)

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COMPUTER-ASSISTED INSTRUCTION: THE MICROCOMPUTER AS AN ELECTRONIC TEACHERS'S AIDE

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INSTRUCTION MANAGEMENT SYSTEMS:

IMS: A NEW SOFTWARE APPROACH TO CAI

The Chronicle of Higher Education recently reprinted the text of "A Nation at Risk: The Imperative for Education Reform," the report from The National Commission on Excellence in Education. The most discussed finding of this report suggests that our current educational system has eroded to the point that other nations are matching and surpassing our educational achievement. One analyst, Paul Copperman, has come to the following conclusion:

> Each generation of Americans has outstripped its parents in education, in literacy, and in economic attainment. For the first time in the history of our country, the educational skills of one generation will not surpass, will not equal, will not even approach those of their parents. (p. 11)

Recommendations from this report stress that educators should increase their emphasis on science, mathematics, English, computer science, and social studies to establish curricula in the first crucial eight grades to provide a sound basis for further study. Other recommendations call for improvements in textbooks including a call for new instructional materials to reflect current applications in technology. Copperman further stated that "....because no textbooks in any subject can be geared to the needs of all students, funds should be made available to support text development in "thin market" areas, such as those for disadvantaged students, the learning disabled, and the gifted and talented" (p.14).

Teachers apparently share this opinion as evidenced in a report entitled "National Needs Assessment of Educational Media and Materials for the Handicapped" (NNA), published by Educational Testing Services in 1978. Teachers

report that content per se was not their most significant educational problem. The real problem, they said, was the need to modify curricula to fit the varying skills and disabilities of the mainstreamed mildly handicapped population. The report also stated that the primary reason teachers gave for needing supplementary materials was the lack of variety and the flexability to individualize the currently available materials. More specifically, currently available materials fail to provide sufficient repetition of stimuli or reinforcement and, in addition, ability to hold attention, rate of concept introduction, and language/vocabulary levels were often inappropriate for handicapped learners. The teachers strongly expressed the need to adapt materials by making improvements in the following areas: (a) independent use by the student, (b) increased supplementation, including manipulatives and gaming, (c) adaptation to a variety of disabilities, (d) different entry levels, and (e) evaluation of the student's progress.

It would appear that educators are still searching for effective materials and instructional delivery modes which can be easily adapted to the particular needs of exceptional learners. In the past, special educators have always demonstrated the availability to be innovative when designing teaching strategies to meet the needs of their students. The current microcomputer revolution currently sweeping through our schools is not an exception. Technology has often provided potential for solving curricular and instructional delivery problems of teachers such as those stated previously. Although the use of computers to provide effective instruction and instructional management is currently based more on conjecture than on empirical data, there is great potential for the computer to serve as an aide to teachers. Computers can provide: (a) assessment of current educational levels, (b) prescribed curricula based on the students' assessed needs, (c) controlled vocabulary level, (d) individualized instruction suitable

to varying cognitive levels, (e) systematic repetition of instruction so that potential of concept learning is increased, and (f) monitoring and maintenance of student progress. (Taber, 1983). These attributes make the computer a potentially effective instructional delivery and management system that merits investigation.

The purpose of this article is to describe the IMS model and how it can be used by a classroom teacher to plan and implement classroom instruction. IMS is a computer based material generation and record management software program designed to be used by remedial education teachers as a supplement to traditional mathematics textbook series. IMS was developed at Utah State University under the contract from the Technology and Marketing Branch of Special Education Programs and has been field tested in secondary school resource rooms in Utah and Idaho. IMS is a unique model because it includes aspects of both CAI and CMI. IMS is intended, like many CMI programs, to be used by a teacher or teaching assistant. In includes the CMI capabilities of instructional management via a record keeping component which allows teachers to track student academic performance by objective CAI aspects of the program which include the sophisticated capacity to provide the teacher with: (a) sequenced behavioral objectives, (b) printouts of placement tests, (c) printouts of individualized worksheets, and (d) printouts of students progress records. All objectives are cross referenced to commercial mathematics textbooks so that instruction remediated with IMS may continue into the classroom.

As previously mentioned, IMS is intended to serve as a supplement to traditional mathematics textbook series. Its key advantage is its flexibility of instructional use. For example, if a student has been unsuccessful in the classroom, IMS can provide a structured instructional sequence on a particular objective including a systematic teaching strategy with accompanying teaching and

testing worksheets. On the other hand, the student who needs drill and practice on specific problems can also be accommodated within the program.

Each of the major components of IMS are further described in the narrative with follows.

Sequenced Objectives

IMS is organized into a series of content specific disks. Each content disk contains mathematic algorithims which, when executed, produce a printout worksheet or test based on a particular objective. The objectives are organized in a simple to complex sequence within each content disk. The objectives also appear in the Teacher's Manual, cross referenced to a major textbook series.

Placement Tests

Individual placement tests can be generated from each disk for individual students. Specific academic deficits are identified by objective, and the student is placed within the instructional sequence. The placement test can be generated to test as few as one objective, all objectives on the disk, or a range of objectives. Individualized placement tests can be generated for a single student or may be used with a group of students with similar skills. In any situation, the items are randomly generated so that each test is different.

Worksheets

Placement of the student into the instructional sequence occurs subsequent to scoring the placement test. Since four types of randomly generated worksheets are available (Instruction, Practice, Mastery, and Review)) from IMS, teachers are provided with materials to assist in initial instruction or drill and practice activities.

Instruction Worksheets are designed to be used by a teacher in a direct instruction format. Instruction worksheets are accompanied by a scripted teaching strategy (located in a Teacher's Manual), a worked sample problem with prompted "student helps" which maybe used to direct the teacher and learner through the initial instruction phase, and several rows of randomly generated practice problems. This worksheet format is intended to be used by the teacher to teach initial concepts.

Practice Worksheets provide the "next logical step" to the initial instruction phase. The sample problem and "student helps" are included at the top of the worksheet followed by rows of problems. The teacher uses the sample problem to test whether or not the learner can compute the problem type. Once the teacher determines the students' ability to solve the problem, the practice problems can be assigned to reinforce concept acquisition.

Mastery Worksheets provide seven rows of randomly generated problems without prompts or examples. This type of worksheet is intended to be used as a drill and practice activity and to determine mastery of the content.

Review Worksheets provide one row of randomly generated problems for each selected objective. It is intended to provide data on skill maintenance.

Student Progress Records

The record keeping function provides the teacher with the capability of entering students' daily performance scores which, in turn, are deposited in data banks for each student. The teacher can retrieve these data via screen display or as a printout. A running account of daily performance scores (either tabularized or graphed), or a summary record of all objectives mastered maybe accessed on screen or as a printout. Data display options are percent correct or

number of correct responses per minute. This courseware option can assist the teacher with the routine task of computing and recording student performance data but can also be used by the teacher as a tool to plan future instruction based on up to date student achievement.

Teacher's Manual

The accompanying manual maybe used by the teacher who is learning to use IMS. It includes a description of computer requirements, full instruction for "how to use IMS", trouble shooting guide, plus the cross-referencing of all IMS objectives to commercial textbooks.

Future Software Trends

What effect will the IMS model have on future software production and how will this product be received by teachers in the field? The answers to both of these questions is unresolved. To date, teachers involved in the field test or who have viewed the product voice very favorable opinions of the product's potential utility. Some teachers focus on the worksheet and testing features, stating that hours of time currently spent in searching for appropriate materials will be saved. Other teachers are just as enthusiastic about the utility of the record keeping/reporting function as an efficient method for keeping track of daily progress and the Summary Record to quantify which have reached master level.

In a society where computer literacy is growing in importance and numbers of computers in schools improves each year, teachers still experience problems with adequate access to computers. Because the IMS courseware is not used by students but by teachers as a sophisticated instructional aide it is possible IMS and other similar courseware will soon become a useful "electronic aide" in the classroom.

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